We claim:

1. A process for carrying out a high-temperature reaction, in which starting materials are supplied to a reaction chamber (4) through channels (2) of a burner block (3), where in the reaction chamber (4) the high-temperature reaction having a short residence time takes place at a temperature of at least 1500°C and the reaction mixture is subsequently rapidly cooled in a quench area (5), characterized in that in the quench area (5) firstly a direct cooling to a temperature in the range from 650°C to 1200°C takes place by supply of an evaporating quench medium and subsequently an indirect cooling in a heat exchanger takes place.

2. A process as claimed in claim 1, characterized in that the starting materials are premixed.

3. A process as claimed in claim 1, characterized in that the direct cooling takes place to a temperature in the range from 700°C to 1000°C.

4. A process as claimed in claim 1, characterized in that the direct cooling takes place in one or more stages.

5. A process as claimed in claim 1, characterized in that the quench medium is water or a hydrocarbon or a hydrocarbon mixture.

6. A process as claimed in claims 1, characterized in that the indirect cooling takes place to less than 300°C.

7. A process as claimed in claim 1, characterized in that the indirect cooling is utilized for the preheating of the starting materials or for the generation of steam.

8. A reactor (1) for carrying out a process as claimed in claim 1, characterized in that all the surfaces restricting the reaction chamber (4) are formed using a fire-resistant ceramic stable at reaction temperature having an alumina content of at least 80%.

9. A reactor (1) as claimed in claim 8, characterized in that the fire-resistant ceramic is introduced into the reaction chamber (4) in the form of stones or blocks or as a cast or tamped mass and subsequently compressed, dried and calcined, the calcining process preferably taking place owing to the high temperature reaction.

10. A reactor (1) as claimed in claim 8, characterized in that the fire-resistant ceramic has a thickness in the range from 7 to 30 cm.

11. A reactor (1) as claimed in claim 8, characterized in that the transition of the reaction chamber (4) to the quench area (5) is designed in the form of a gap which has a width in the range from 2 to 200 mm.

12. A reactor (1) as claimed in claim 11, characterized in that the transition of the reaction chamber (4) to the quench area (5) is designed in the form of an annular gap.

13. A reactor (1) as claimed in claim 11, characterized in that the reaction chamber (4) is designed in the form of an annular gap.

14. A reactor (1) as claimed in claim 11, characterized in that the channels (2) in the burner block (3) are aligned in the direction of the longitudinal axis of the reaction chamber (4).

15. A reactor (1) as claimed in claim 11, characterized in that some of the channels (2) for the reaction chamber and/or channels (6) for the supply of additional oxygen or of reaction auxiliaries are aligned at any desired angle to the longitudinal axis of the reaction chamber (4).

16. A reactor (1) as claimed in claim 11, characterized in that the quench area (5) is constructed aligning in the direction of the longitudinal axis of the reaction chamber (4).

17. A reactor (1) as claimed in claim 8, characterized in that the supply of the quench medium to the direct cooling takes place via quench nozzles which are attached to one or more distributors.

18. A reactor (1) as claimed in claim 17, characterized in that the quench nozzles are arranged radially or tangentially to the main flow direction of the reaction mixture, where in the case of multistage supplies with tangential arrangement a countercurrent positioning of the quench nozzles is preferred.

19. A process for the scale-up of a reactor (1) as claimed in claim 11, characterized in that for a throughput enlargement the internal diameter of the reactor (1) is enlarged

and the gap size at the transition from the reaction chamber (4) to the quench area (5) is kept constant.

20. The use of a process as claimed in claim 1 or of a reactor (1) as claimed in claim 8 for the preparation of acetylene by partial oxidation of hydrocarbons using oxygen.